



COMPARING APPLES AND CHICKENS: HOW TOPIC AND NOUN FREQUENCY AFFECT IDIOM TRANSPARENCY

Bachelor's Project Thesis

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Abstract: Idiom transparency, or the ease with which their figurative meaning can be derived from their literal meaning, is an important aspect of idioms. Researching what affects idiom transparency could improve linguistic models and teaching programs for second-language learners. Recent research shows that topic is an interesting, relatively unexplored characteristic of idioms. In addition, the effect of frequency of encountering specific parts of an idiom is quite unexplored. In an attempt to shed more light on these characteristics, this research investigated the effects of idiom topic and noun frequency on transparency. Four different idiom topics (shipping, food, animals, and body-parts) were selected, and a set of stimuli was created, consisting of 60 Dutch idioms, fifteen idioms per topic. The noun frequencies of these idioms were acquired from a lexical database. Transparency ratings for these idioms were collected via a questionnaire, aimed at (ex-)students in the range of 18-30 years old. The collected data was analyzed using linear mixed-effects models. Analysis revealed that noun frequency and topic did not significantly affect transparency. However, a second analysis showed that there does appear to be some effect of topic on transparency. Further research is needed to validate this finding. The results of this study only generalize to single noun idioms, as a result of the idiom selection process.

Written and spoken language is mostly compositional. This entails that the meaning of a complex expression can be derived from the meaning of its parts together with the way they are combined (Pelletier, 1994). There are however exceptions that are non-compositional, such as idioms. Idioms are multiword expressions, whose meaning is not a function of the meanings of its parts and the way in which they are syntactically combined (van der Linden, 1992). Take for example the idiom "spilling the beans". If compositionally analyzed, the meaning of this construct could be interpreted as "accidentally letting some beans drop on the floor". However, its intended meaning is often figurative, namely, to share a secret.

Idioms play an important role in language. They are used so frequently that people are often unaware of their presence in everyday conversation. Kerbel and Grunwell (1997) found that teachers who believed they rarely used idioms, still used 1.73 idioms per minute. Although this may sound like a lot initially, this finding is not that surprising, con-

sidering there are more than 10.000 idioms in the English language (Brenner, 2003). Idioms are useful in everyday conversations. They can convey a concept more effectively than their compositional equivalents, often using fewer words and providing more nuance (Brenner, 2003). The idiom "it runs in the family", for example, is shorter than saying "something is common through multiple generations in one's family".

Because idioms are such an important part of language, research regarding the way humans judge and process idioms is important for fields such as computational linguistics and foreign language learning. Due to the non-compositional nature of idioms, having computer programs correctly infer the meaning of idioms is still a challenge (Zeng & Bhat, 2021). Acquiring more information on how humans process and judge idioms could aid in making better linguistic models. Second-language (L2) learners also have been found to have difficulty learning idioms (Cieřlicka, 2006; Steinel, Hulstijn, & Steinel, 2007). A better understanding of id-

ioms can improve teaching programs for L2 learners (Cucchiarini, Hubers, & Strik, 2022a).

Even though idioms are considered to be non-compositional, it is often still possible to derive their meaning (to some extent) from their parts. The degree to which the figurative meaning can be derived from its literal meaning is referred to as transparency (Cieřlicka, 2015; Nunberg, Sag, & Wasow, 1994). Idioms are referred to as being transparent when their figurative meaning can mostly be derived from their literal meaning. For example, "to play with fire", which means "to do something risky". On the other hand, idioms of which it is difficult to derive their figurative meaning are referred to as opaque. An example of an opaque idiom would be "kicking the bucket", of which the figurative meaning is "to die".

Transparency is frequently used as a predictor in idiom studies. These studies often investigate the effect of transparency on the ease of acquisition and processing of idioms (Cieřlicka & Heredia, 2017; Steinel et al., 2007; Tiv, 2016). Generally, these studies find that transparent idioms are faster acquired than opaque idioms (Cucchiarini, Hubers, & Strik, 2022b; Steinel et al., 2007), and that transparent idioms are more comprehensible than opaque idioms (Cacciari & Levorato, 1998; Cieřlicka & Heredia, 2017; Nippold & Rudzinski, 1993).

Although transparency is often studied as a predictor for other response variables, few studies have explored the effect of other idiom characteristics on transparency. Hubers, Cucchiarini, Strik, and Dijkstra (2019) investigated the relationship between multiple idiom characteristics. Besides transparency, they looked at how easily participants could form a mental image of an idiom (imaginability) and at how familiar participants were with the meaning of an idiom (familiarity), amongst other characteristics. Transparency, familiarity, and imaginability are all subjective idiom characteristics. These characteristics are obtained by asking participants to judge them on a scale. Hubers et al. (2019) found a significant positive correlation between all investigated subjective ratings. Furthermore, they found that idiom knowledge (knowledge of the figurative meanings of idioms) positively correlated with transparency. There is however little known about the relationship between transparency and other idiom characteristics.

Recently, Sprenger and van Rij (2022) investigated a previously unexplored aspect of idioms: idiom topic. After comparing familiarity ratings of three different groups of idioms (idioms about body-parts, idioms that originate from shipping, and idioms with a biblical origin), they found that people would become familiar with idioms about body-parts at a younger age than idioms about shipping. This could imply that the relation between age and familiarity differs per topic. They speculated that the lower familiarity associated with idioms that originated from shipping could be explained by people being unfamiliar with the meaning of the words they contain. Such as the noun "modderschuit", which is a Dutch term for mud barge, that is no longer used in modern language. This unfamiliarity could make it more difficult to remember those idioms. Furthermore, they suggest that people could be more familiar with idioms about body-parts because they are often more transparent. Another possible explanation for why people could be more familiar with idioms about body-parts comes from Lakoff (1987). Lakoff states that children understand the world in terms of their bodies and the relations between their bodies and the world. Because this relation between the body and the world is established early on, it could be that idioms about body-parts feel more familiar at a younger age.

Since Hubers et al. (2019) found a correlation between familiarity and transparency, it could be that the differences in familiarity per topic, that Sprenger and van Rij (2022) found, also extend to transparency. In addition, it is expected that deriving the figurative meaning of an idiom from its literal meaning becomes more difficult if one does not know the meaning of its words. Therefore one might expect, that if one is less familiar with the meaning of words of certain topics, these topics would be less transparent as well.

Whilst it is common for idiom research to include idiom frequency (Cronk, Lima, & Schweigert, 1993; Sprenger, la Roi, & van Rij, 2019), noun frequency is relatively unexplored. A possible explanation for people not being familiar with certain nouns, such as "modderschuit" (translation: mud barge), could be that the noun is simply not used frequently enough. We assume that the more frequent a noun is used, the better the understanding of its possible meanings becomes. Having a better

understanding of nouns could aid someone in deriving the figurative meaning of idioms from their words. Another reason to believe that noun frequency affects transparency comes from Sprenger et al. (2019). They found that an increase in idiom frequency leads to an increase in familiarity. Since the frequency of exposure of the whole idiom increases the feeling of familiarity, frequent exposure of parts of an idiom could also improve the feeling of familiarity. And because familiarity and transparency appear to correlate with each other (Hubers et al., 2019), it is expected that the potential effects of noun frequency on familiarity also extend to transparency.

In this paper, the effect of idiom topic and noun frequency on self-reported idiom transparency will be investigated. It is expected that different idiom topics will have different mean transparencies. Moreover, per the findings of Sprenger and van Rij (2022), it is expected that idioms about shipping will have a low transparency, as opposed to idioms about body-parts, which are expected to have a high transparency. As for noun frequency, it is expected that an increase in frequency will lead to an increase in transparency. To test these hypotheses, transparency ratings of a set of Dutch idioms will be collected via an online questionnaire. The collected transparency ratings will be analyzed together with the noun frequencies and topics of each idiom using a linear mixed-effects analysis.

1 Methods

1.1 Participants

100 participants took part in the questionnaire. 47 of those were however excluded because of the following reasons, which will be elaborated on below.

- Not in age range of interest (15)
- Not native Dutch speaker (2)
- Did not complete questionnaire (29)
- Did not complete questionnaire in one session (1)

The clean data consisted of 53 participants in the age range of 18-30 years (mean 21.2, SD 2.5; 19 men). Since Sprenger et al. (2019) found an influence of age on familiarity and Hubers et al. (2019)

found a possible relation between familiarity and transparency. Therefore it could be that age influences transparency. To limit this possible effect, the age range of the participants was restricted to 18-30 years old. Since this research regarded Dutch idioms, entries of participants that mentioned Dutch was not their native language were removed as well. Furthermore, in order to limit the difference in understanding of low-frequency words, participants had to be (ex-)students. All participants that completed the survey met this requirement, so no one was excluded because of it.

The questionnaire was spread via the social network of the author. Participants did not receive compensation for their participation. All participants agreed to informed consent.

1.2 Materials

1.2.1 Idiom topics

There are many different aspects of idioms that could be used to classify them. For example: their figurative meaning, their literal meaning, specific words, or their origin. In this paper, the topic of an idiom is determined based on its nouns, since it is a clear and objective way of doing so. Take for example the topic body-parts. It is relatively straightforward to say whether the noun in an idiom is a body-part or not, and to decide based on that if it should be assigned to the topic body-parts.

This method of assigning topics does however provide difficulties when idioms contain multiple nouns. Take for example the idiom "Met je neus in de boter vallen" (literal translation: To fall in the butter with your nose). This idiom contains the nouns "neus" (translation: nose), which could be assigned to the topic body-parts, and "boter" (translation: butter), which could be assigned to the topic foods. Because this idiom contains multiple topics, it becomes difficult to classify it as belonging to a single topic. Therefore only idioms that contained a single noun were used in this study.

Even when only idioms with a single noun are considered, the problem of idioms belonging to multiple topics still occurs when nouns have multiple definitions (such as idioms with the word "been", which in dutch either references a body-part or a bone). Therefore only nouns of which all definitions fell under the same topic were allowed, such as id-

ioms with the word "peper" (translation: pepper), of which both definitions could be considered food. This criterion was enforced by comparing the possible definitions of nouns in online dictionaries*.

Finally, only idioms of which the noun did not more commonly occur as a different part of speech in the subtexNL database (Keuleers, Brysbaert, & New, 2010) were used. This entails that nouns such as the dutch noun "raap" (which means turnip, but when used as a verb refers to the act of picking something up) were excluded, since they most commonly occurred as a verb.

To investigate the effect of the topic on transparency, four different topics were selected, with each topic containing fifteen idioms. This way multiple topics could be compared with each other whilst each topic was still represented by a diverse set of idioms. The topics and idioms considered originated from Sprenger and van Rij (2022). Their database assigned idioms to various topics. However, only a section of their database was made available for this study. This section contained 787 idioms from the following seven topics: animals, food, money, body, shipping, transportation, and vehicles. The topics: animals, body, food, and shipping were selected for the current study, based on the following criteria.

First of all, the topics needed to be a well-defined set of things, since only then idioms could be assigned to a single topic, based on whether its noun is an example of that topic or not. "Money" for example is not a well-defined topic, since it would be unclear whether things such as coins, ATM, debt, and wage should or should not be part of it. "animals" on the other hand is a well-defined topic, since everything belonging to that topic would be an example of an animal, such as a chicken, a cow or a cat. Secondly, each topic needed to contain enough idioms, such that after filtering out idioms that do not meet the previously mentioned criteria, there are still at least fifteen idioms left.

Only four of the seven topics from the partial database of Sprenger and van Rij (2022) adhered to the previously mentioned criteria. These topics were given a concrete definition in order to ensure they satisfied the criterion of being well-defined. The selected topics and their corresponding definitions were:

- Shipping: Things related to ships/sailing.
- Food: Things that can be eaten or drunk.
- Animals: Animals.
- Body-parts: Appendages of the human body

Note that of the four selected topics, shipping is not as well-defined as the other topics. The nouns assigned to the topic are not examples of "shipping", but things related to shipping. It was however still included due to the findings of Sprenger and van Rij (2022), who found that people became familiar with idioms about body-parts at a younger age than idioms about shipping.

1.2.2 Noun frequencies

Word frequency is the number of times that a word occurs in a given text or corpus. Word frequencies provide an estimate of how often people encounter these words. However, a problem with word frequencies from conventional corpora, is that they do not always reflect everyday speech. A corpus consisting of written articles could, for example, contain more formal language than conventional speech. To circumvent this problem the word frequencies used in this paper were obtained from the subtexNL database (Keuleers et al., 2010). The data used for this database consists of 44 million Dutch words that were sourced from 8443 Dutch subtitle files of films and television series. The creators of this lexical database found that their database provided a better explanation for the variance in a lexical decision task than the commonly used CELEX (Baayen, Piepenbrock, & Gulikers, 1995) database, which sourced its data from newspapers, books and spoken sources.

1.2.3 Figurative meanings

Before participants can judge the transparency of idioms, how easily the figurative meaning of an idiom can be derived from its literal meaning, they must know the figurative meaning. Since it is unlikely that participants will be familiar with the figurative meaning of all idioms, these figurative meanings were provided, along with the literal meaning. This also ensures that all participants judge the transparency of an idiom based on

*<https://www.vandale.nl/>, <https://www.woorden.org/>

the same figurative meaning, as opposed to the potentially varying figurative meanings that different people may associate with an idiom. The figurative meanings used in this paper were collected from Groot, Smit, and Hacquebord (2006). For some idioms the figurative meaning was shortened or simplified. This ensured that the figurative meanings would be clear and comprehensible for the participants.

1.2.4 Stimuli

The set of stimuli used in this paper consisted of 60 idioms, selected from the idiom database of Sprenger and van Rij (2022). These idioms were equally divided over four topics, thus selecting 15 idioms per topic. To get to these 60 idioms, the criteria mentioned in 1.2.1 and 1.2.2 were used. Summarized these were:

- Idioms must contain exactly one noun
- The noun must be part of one of the topics of interest.
- All noun definitions must fall under the same topic
- The noun most commonly occurs as a noun in the Dutch language.

However, after applying these criteria there were still more than 15 idioms left for each topic. From the leftover idioms, idioms with a single verb or without adjectives were selected over other idioms. An advantage of this approach was that the selected idioms contained even fewer words that could be associated with other topics. Furthermore, idioms with unique nouns that were not already part of the stimuli set were chosen over idioms with nouns that were already part of the stimuli set. For example, the list of suitable idioms from the topic animals contained five idioms with the Dutch word "kat" (translation: cat). Only one out of these five idioms was selected for this study. This ensured a diverse set of nouns, and thus more diversity in noun frequencies. The distribution of word frequencies for all selected nouns per topic can be seen in figure 1.1. This figure shows that the mean noun frequencies of the different topics lay relatively close to each other, taking the large spread into account. The complete list of selected idioms with their figurative meanings can be found in appendix A.

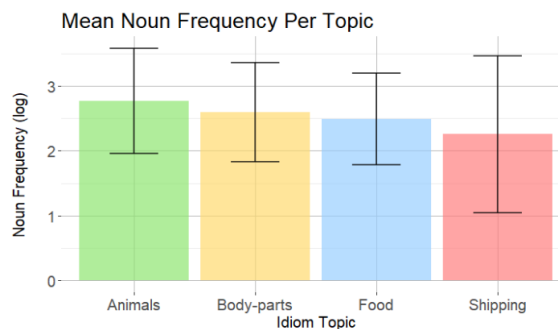


Figure 1.1: The mean noun frequency and standard deviation per topic, with each topic consisting of 15 idioms. X-axis: Topic, Y-axis: Noun frequency (log 10).

1.3 Procedure

Participants could access the questionnaire with an URL. Considering the target age group (18-30 years), the layout of the questionnaire was optimized for mobile devices. The questionnaire started with a short introduction (Appendix B.1) that contained an explanation of the term idiom, together with an example.

After agreeing to the informed consent, participants were asked to enter the following demographic information: age (in years), gender, native language(s), and whether they are or were a student. If participants entered an age outside of the range of 18-30 years, the questionnaire would stop and show the participants a message stating that they were not in the target demographic group.

If participants were in the age range of interest, the questionnaire would continue to a page that explained the aim of the questionnaire in more detail (Appendix B.2). This page explained that the factor of interest of the questionnaire was the relation between the literal and figurative meaning of idioms. Together with this information the idiom "Bij iemand in het krijt staan" (literal translation: To stand in chalk at someone) was provided with an example as to how one might interpret the relation between the literal meaning and its figurative meaning: "Schulden hebben bij iemand" (literal translation: Having a debt to someone).

After this page, detailed instructions for the task followed (Appendix B.3). First, the template of the questions was described. This layout used differ-

ent colors and font weights to help the participants distinguish the literal and figurative meanings, as illustrated in figure 1.2.

Next, the participants were told they needed to judge how easily the figurative meaning could be derived from the literal meaning of the idioms on a scale from one to six. Underneath these instructions, two example questions were shown, together with an explanation of how one might rate them. The first one being "De laatste adem uitblazen: doodgaan" (translation: To blow out your last breath; to die), which was included as example of a transparent idiom. The other one was "In de gaten houden: toezien, opletten" (translation: Keep in the holes: supervise, watch), which was included as an example of an opaque idiom.

After reading the instructions a short message was displayed that told the participants that there were no correct or wrong answers and that the participants should follow their first intuitions when answering the questions. The questionnaire started with two anchoring questions. These were included to help the participants form an idea of how the idioms should be rated on the provided scale. Those two idioms were: "Om zeep helpen: doden" (translation: Help around soap: kill), which was included as an example of an opaque idiom, and "Iemand de rekening presenteren: iemand vragen verantwoordelijkheid te nemen voor financiële kosten of andere gevolgen" (translation: present someone the bill: ask someone to take responsibility for costs or other consequences) as an example of a transparent idiom. After answering these two anchor questions the participants were exposed to all 60 idioms from the stimuli set in randomized order. They were presented one at a time and participants did not have the option to skip questions or to go back to a previous question.

All 60 questions and the two anchor questions were formatted as in figure 1.2. Each question asked the participant how easily the figurative meaning of an idiom could be derived from the literal meaning of its words. Participants could answer these questions on a 6-point scale, ranging from "1: erg makkelijk" (1: very easy) to "6: erg moeilijk" (6: very difficult). A 6-point scale was chosen to allow participants to have enough options to express their opinion, whilst eliminating the option of giving a neutral answer. This forced participants to think more carefully about their answer.

<p>Hoe makkelijk is de figuurlijke betekenis van de uitdrukking af te leiden uit de letterlijke betekenis van de woorden van de uitdrukking? Uitdrukking: <i>figuurlijke betekenis.</i></p>	<p>How easy is it to derive the figurative meaning of the idiom from the literal meaning of the words of the expression? Idiom: <i>figurative meaning.</i></p>
<input type="radio"/> 1: Erg makkelijk	<input type="radio"/> 1: Very easy
<input type="radio"/> 2	<input type="radio"/> 2
<input type="radio"/> 3	<input type="radio"/> 3
<input type="radio"/> 4	<input type="radio"/> 4
<input type="radio"/> 5	<input type="radio"/> 5
<input type="radio"/> 6: Erg moeilijk	<input type="radio"/> 6: Very difficult

Figure 1.2: Left: the question template as used in questionnaire (Dutch). For each question, "Idiom: figurative meaning" would be substituted for the respective idiom and its figurative meaning. Right: translation.

2 Results

To investigate whether noun frequency and idiom topic affect transparency, transparency ratings were collected for 60 idioms, which were equally subdivided across 4 topics.

The two plots in Figure 2.1 show the relationship between idiom transparency and noun frequency. Each of the 60 idioms used for this study is represented by a point on both plots. Note that these plots are not part of the statistical analysis, but serve to give insights in the collected data.

The plot on the left shows the relationship between noun frequency and transparency, not taking topics into account. Since the slope of the linear regression line is not zero, there might be an effect of noun frequency of transparency. The standard error, as indicated by the gray region, is however quite large. This suggests that the observed relation might just be coincidental.

The plot on the right shows how topic affects the relationship between noun frequency and transparency. This plot contains four regression lines, one per topic. Since the slope of the regression lines differs per topic, there appears to be an interaction between topic and noun frequency.

Figure 2.2 shows the mean transparency per topic. This plot shows that not all topics have the

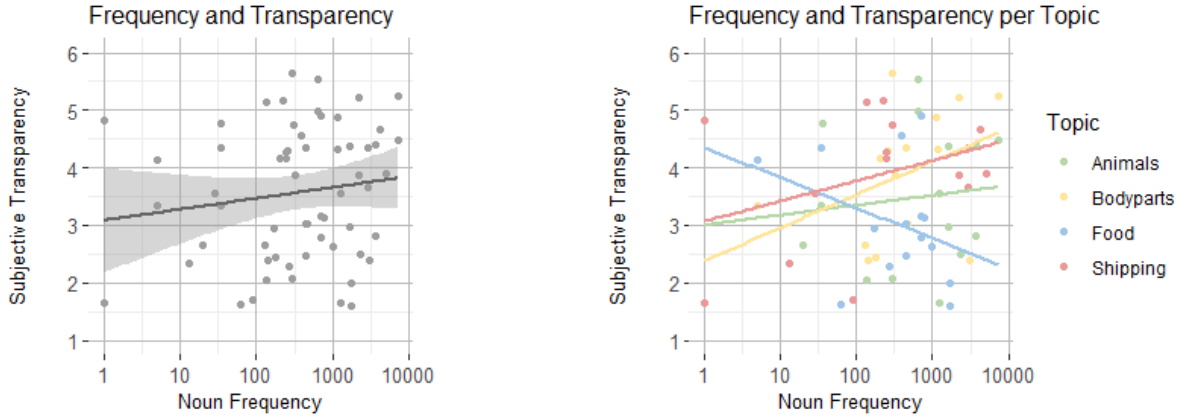


Figure 2.1: Left: The relation between the mean subjective transparency and noun frequency. Each data point represents one idiom. A regression line with the standard error is shown as well. Right: The relation between the mean subjective transparency and noun frequency per topic. Each data point represents one idiom, colored by its topic. Regression lines are shown for each of the four topics. Both: X-axis: Noun frequency from SubtlexNL + 1, such that the axis could be scaled logarithmically. Y-axis: mean subjective transparency, with 1 being opaque and 6 being transparent.

same mean transparency. Interestingly enough, the topics body-parts and shipping seem to have approximately the same mean transparency. This is unexpected given the findings of Sprenger et al. (2019), who found that the topics shipping and body-parts showed a difference in familiarity trend over age, suggesting a difference in age of acquisition of these idioms.

The effect of the independent variables (noun frequency and topic) on the dependent variable (transparency) was investigated using linear mixed-effects models (Bates, Mächler, Bolker, & Walker, 2015) (R version 4.0.3, lme4 version 1.1-31), following instructions from Winter (2013).

A complete model was created, taking into account the effects of topic, frequency, the interaction between them, and the random intercepts for each participant and idiom. A comparison between the complete model and a model without the interaction between topic and noun frequency suggested that the interaction between topic and noun frequency is not significantly contributing to the model ($\chi^2(3)=4.5713$, $p=0.206$). After that, two model comparisons were performed, with each main effect removed separately. From these comparisons, it appears that the effects of noun frequency ($\chi^2(1)=1.7846$, $p=0.1816$) or topic ($\chi^2(3)=6.2213$,

$p=0.1013$) did individually not significantly contribute to the model either.

Table 2.1: Estimates of the fixed effects, the standard error and the t-value in the complete model, without the interaction between topic and frequency

Fixed effect	estimate	SE	t-value
Intercept (Topic Food)	4.499	0.493	9.133
Topic Animals	-0.376	0.395	-0.952
Topic Body-parts	-0.821	0.393	-2.089
Topic Shipping	-0.876	0.395	-2.220
Frequency	-0.216	0.161	-1.346

Whilst from these results it does not appear that idiom topic has a significant effect on transparency, this does not mean that there is no effect at all. It could be that the effect of topic appears to be not significant because the mean transparencies of two of the four topics (shipping and body-parts) are too similar to each other (figure 2.2), thus not being significantly different. Table 2.1 shows the fixed effects of the complete model. From this table, it appears that the estimated fixed effects of these two topics do indeed lie very close to each other, both differentiating -0.821 (body-parts) and -0.876 (shipping) respectively, from the intercept (food).

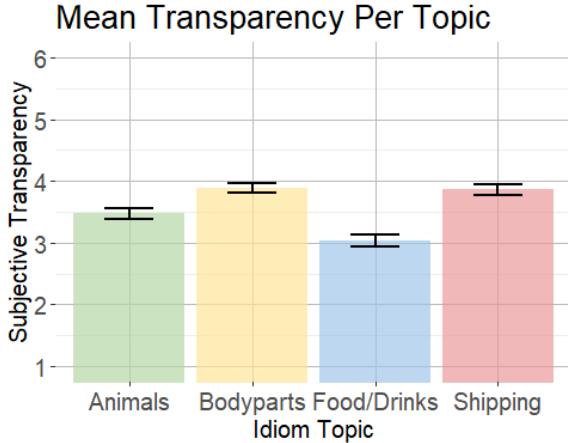


Figure 2.2: The mean subjective transparency per topic, averaged over all transparency ratings of idioms per topic. Error bars represent the standard error. X-axis: idiom topics. Y-axis: mean subjective transparency, with 1 being opaque and 6 being transparent.

Furthermore, when comparing models with and without topic included, the variance that originally was accounted for in topic shifts towards the random effects for the idioms (Table 2.3). This table shows that the variance accounted for by each idiom increases from 1.1332 to 1.2597 when topic is not included as a fixed effect. Figure 2.3 shows the shift from the fixed effect topic, toward the random effect for each idiom. The amount of change in random effect appears to be roughly the same per topic. This indicates that topic is still accounted for in the model, even when not included as a fixed effect.

Therefore, another analysis was done in which the topics body-parts and shipping were grouped together, so that there would be three topics (body-parts + shipping, food and animals). As with four separate topics, a model comparison suggested that the interaction between topic and noun frequency is not significantly contributing to the model ($\chi^2(2)=4.2706$, $p=0.1182$), just as noun frequency ($\chi^2(1)=1.7679$, $p=0.1836$). However, in this model, topic did have a significant effect on transparency ($\chi^2(2)=6.2023$, $p < 0.05$). The fixed effects table of the model without the interaction between topic and frequency can be seen in table 2.2.

Table 2.2: Estimates of the fixed effects, the standard error and the t-value in the complete model, with the topics shipping and body-parts combined, without the interaction between topic and frequency

Fixed effect	estimate	SE	t-value
Intercept (Topic Animals)	4.114	0.526	7.821
Topic Body-parts & shipping	-0.471	0.345	-1.367
Topic Foods	0.377	0.395	0.954
Frequency	-0.213	0.159	-1.339

Table 2.3: Estimates of the random effects with and without topic included

	variance	
	with topic	without topic
Idioms	1.1332	1.2597
Participants	0.3071	0.3072
Residual	1.2585	1.2585

3 Discussion

This research aimed to investigate how noun frequency and idiom topic affect transparency. The results indicate that noun frequency does not significantly affect idiom transparency. The effects of all investigated topics on transparency did not significantly differ from each other either. However, an extra analysis with the topics body-parts and shipping combined showed that the topic of an idiom might affect its transparency.

3.1 Interpretations

The hypothesis consisted of two expected effects. Firstly, it was expected that different idiom topics have different mean transparencies. The findings regarding topic supported this hypothesis to some extent. However, per the findings of Sprenger and van Rij (2022), it was expected that the topic shipping would be opaque, especially compared to the topic body-parts. Instead shipping turned out to be the most transparent topic, together with body-parts. This appears to contradict the findings of Sprenger and van Rij (2022). Sprenger and van Rij (2022) did however investigate the effect of topic on familiarity instead of topic on transparency. Because Hubers et al. (2019) found a correlation between familiarity and transparency, it was expected to find the same results as Sprenger and van Rij (2022).

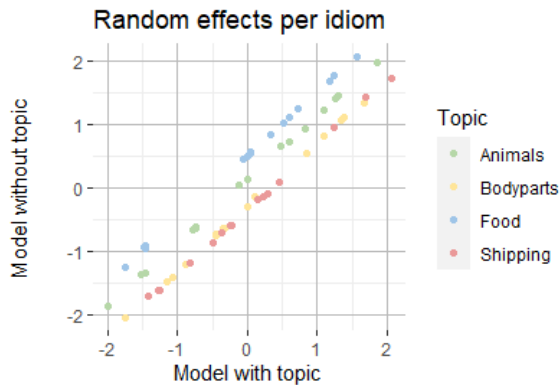


Figure 2.3: The comparison of random effects per idiom between a model that includes topic as a fixed effect (X-axis) and a model that excluded topic (Y-axis).

It appears that either the correlation between familiarity and topic does not hold for the idioms investigated, or that the idioms used in the current research, a subset from Sprenger and van Rij (2022), do not represent the topics in the same way as the full selection.

The other expected effect was that an increase in noun frequency would lead to an increase in transparency. There is however no evidence in favor of a relation between noun frequency and transparency in the analyzed data. It was assumed that this relation would be present since Sprenger et al. (2019) found that an increase in idiom frequency increased familiarity. The assumption that this relationship would also hold for noun frequency, therefore, appears to be incorrect. A possible explanation for not finding a relation could be that idiom frequency does not necessarily correlate with noun frequency, since some relatively frequent idioms can contain infrequent nouns, and the other way around.

The results regarding idiom topic build on the existing evidence from Sprenger and van Rij (2022). There appears to be something about idiom topic that affects the way idioms are interpreted. The results on noun frequency show that further research is needed to say something about the effects on noun frequency.

3.2 Generalizability

The generalizability of the results regarding topic is limited due to a few factors. One of these factors is that there might not have enough idioms of each topic to properly represent said topic. The idiom database from Sprenger and van Rij (2022) contained 331 idioms that contained body-parts. The idioms about body-parts used in the current research amount to only 4.5% of the idioms in the database of Sprenger and van Rij (2022), and even then it is reasonable to believe that the true amount of idioms containing body-parts is higher.

Another factor that limits the generalizability of the results regarding idiom topic are the constraints and preferences used for selecting idioms from a topic. First of all, the constraints (1.2.4) introduced to limit ambiguity in idiom topic could have resulted in the topics not being a good presentation of the idioms in that topic. If a property of a topic would have been that it contained relatively many idioms with multiple nouns, this characteristic would have gone unnoticed since all idioms with more than one noun were disregarded. Idioms of which all definitions of a noun did not fall under one topic were also disregarded. This resulted in especially some idioms with high-frequency nouns being disregarded, since those appear to have multiple definitions more often.

Furthermore, the criteria used for selecting idioms might have resulted in a selection that does not accurately represent a topic. To investigate the effect of noun frequency, as many as possible idioms with different nouns were selected. However, some topics, such as body-parts, originally contained over 30 idioms with the same noun (example nouns: hand and ear). This resulted in most of those idioms being excluded.

Even with this limited generalizability, the results regarding the effect of topic on transparency are nonetheless interesting. Since this research aimed to investigate whether different topics have different effects on transparency, as opposed to correctly estimating the effect different topics have on transparency.

The findings on the effect of noun frequency on transparency do appear to be generalizable to a broader set of nouns, since this regarded the full set of 60 idioms. The effect of noun frequency on transparency was however only investigated for sin-

gle noun idioms. Whilst there is no evidence to believe that there would be a different effect on idioms with multiple nouns, this can not be concluded from this study.

For future research it might be interesting to delve deeper into the effects of idiom topic on other subjective ratings, and into the cause of the effect of topic, thus investigating the properties of different topics. It might also be interesting to look for a different system for categorizing topics, so that a broader range of idioms can be included under them and other research could profit from a more sophisticated classification system.

Whilst this research investigated the effect of noun frequency on idiom transparency, in future research, it could be interesting to explore the effect of idiom frequency on transparency. Since it could be that the ease of which an idioms figurative meaning can be derived from its literal meaning increases with the frequency of usage.

This research hoped to extend the knowledge about idiom characteristics. It contributed to the general knowledge with the finding that noun frequency does not relate to idiom transparency. Furthermore, it contributed with the findings that idiom topic does affect transparency ratings, and therefore potentially other subjective ratings as well.

4 Conclusion

This research aimed to shed more light on the effects of topic and noun frequency on idiom transparency. Participants judged the transparency of a set of idioms, which were subdivided across multiple topics. Based on the results of the performed analyses, it can be concluded that noun frequency does not affect idiom transparency. The initial results do not indicate that different idiom topics have different effects on transparency, but a second analysis showed that there might be something to topic that is worth investigating further.

The mean transparencies of the topics body-parts and shipping were almost identical to each other. This finding was unexpected since Sprenger and van Rij (2022) found a large difference in familiarity between those topics. It is still unclear whether this difference is due to a different representation of topics than in the research of Sprenger

and van Rij (2022) or due to some other factor.

The finding that noun frequency did not affect transparency was unexpected. This shows that the effect that idiom frequency has on familiarity likely does not translate to noun frequency.

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A Appendix

List of all idioms(Dutch) used in this research, together with the used figurative meanings(Dutch) and their topic. The noun of each idiom is written in bold

Idiom	Figurative meaning	Topic
Recht door zee gaan	Eerlijk voor zijn bedoelingen uitkomen.	Shipping
De wind van voren krijgen	Scherp terechtgewezen worden.	Shipping
Buiten de boot vallen	Niet meer meedoen.	Shipping
Het anker lichten	Vertrekken.	Shipping
Bakzeil halen	Minder hoge eisen stellen dan je eerder deed.	Shipping
Iets voor de boeg hebben	Iets in het vooruitzicht hebben.	Shipping
Iets over een andere boeg gooien	Van aanpak veranderen.	Shipping
Iemand de loef afsteken	Iemand overtreffen.	Shipping
Schoon schip maken	Moeilijkheden oplossen.	Shipping
Het tij keren	Zorgen dat er een omslag plaatsvindt.	Shipping
Op zee blijven	Omkomen op zee.	Shipping
Voor de mast zitten	Niet opkunnen wat men op zijn bord heeft.	Shipping
Poolshoogte nemen	Ergens gaan kijken om te weten te komen hoe het er toegaat.	Shipping
Alle zeilen bijzetten	Zicht tot het uiterste inspannen.	Shipping
Iemand op sleptouw nemen	Omdat iemand het alleen niet lukt diegene helpen.	Shipping
Iemand voor de leeuwen gooien	zonder hulp aan omstandigheden worden blootgesteld die iemand mogelijk niet aan kan.	Animals
De aap beet hebben	Het geld ontvangen hebben.	Animals
Als door een adder gebeten zijn	Zeer fel reageren.	Animals
Zo doof als een kwartel zijn	Heel erg doof zijn.	Animals
Kijken hoe de hazen lopen	Voorzichtig te werk gaan.	Animals
Zo ziek als een hond zijn	Heel erg ziek zijn.	Animals
Niet voor de poes zijn	Iemand zijn waar rekening mee gehouden dient te worden.	Animals
Zijn kat sturen	Niet komen opdagen.	Animals
Geen kip meer kunnen zeggen	Zoveel hebben gegeten dat je niets meer kan eten.	Animals
Er als de kippen bij zijn	Er zeer vlug bij zijn.	Animals
Vechten als een leeuw	Dapper vechten.	Animals
Over het paard getild zijn	Verwend worden en daardoor verwaand zijn.	Animals
Hoog te paard zitten	Zichzelf verheven voelen boven anderen.	Animals
Een uiltje knappen	Een dutje doen.	Animals
Voor aap staan	Belachelijk zijn.	Animals
In de soep laten lopen	Volledig laten mislukken.	Food
Een appeltje met iemand te schillen hebben	Boos zijn op iemand en hem daarmee willen confronteren.	Food
Iets op de boterham krijgen	Iets als verwijt krijgen.	Food
Op eieren lopen	Uiterst voorzichtig zijn.	Food
Zijn ei kwijt kunnen	Zich kunnen uitspreken.	Food
Er geen kaas van gegeten hebben	Geen verstand van iets hebben.	Food

De melk op trekken	Je belofte niet helemaal vervullen.	Food
Iets in de melk te brokkelen hebben	Invloed hebben.	Food
Naar peper ruiken	Erg duur zijn.	Food
Er geen chocola van kunnen maken	Niet te begrijpen zijn.	Food
Iemand een worst voorhouden	Iemand iets aanlokkelijks in het vooruitzicht stellen om iets gedaan te krijgen.	Food
In de bonen zijn	Niet goed weten waar je bent of wat je moet doen.	Food
Peentjes zweten	Heel erg zweten.	Food
Iets is een eitje	Heel eenvoudig zijn.	Food
Er geen biet van snappen	Er niks van snappen.	Food
Aan iemands lippen hangen	Aandachtig luisteren.	Body-parts
Onder de voet gelopen worden	Vertrapt worden door een grote menigte.	Body-parts
Op zijn teentjes getrapt zijn	Gekwetst zijn.	Body-parts
Iets uit de duim zuigen	Iets verzinnen.	Body-parts
Op zijn neus kijken	Teleurgesteld zijn.	Body-parts
Er de buik vol van hebben	Meer dan genoeg hebben van iets.	Body-parts
Niet op zijn achterhoofd gevallen zijn	Slim zijn.	Body-parts
Zichzelf op de borst slaan	Laten merken dat je vind dat je iets goed hebt gedaan.	Body-parts
Iets achter de ellebogen hebben	Achterbaks zijn.	Body-parts
Uit zijn heup schieten	Overgaan tot het gebruik van geweld.	Body-parts
Door zijn knieën gaan	Zijn weerstand opgeven.	Body-parts
Zijn mond voorbij praten	Iets zeggen wat verzwegen had moeten worden.	Body-parts
Met zijn pink manoeuvreren	Iets als de beste kunnen.	Body-parts
Goed van de tongriem gesneden zijn	Gemakkelijk kunnen praten.	Body-parts
Op de vuist gaan	Vechten.	Body-parts

B Appendix

The following sections of dutch text contain the welcome message and instructions as presented in the questionnaire.

B.1 Welcome message

Leuk dat je mee wilt doen aan dit onderzoek over Nederlandse uitdrukkingen.

Een uitdrukking is een combinatie van woorden waarvan de betekenis afwijkt van de letterlijke betekenis van de woorden. Denk bijvoorbeeld aan "over koetjes en kalfjes praten", dat heeft niks te maken met koeien, maar betekent over allerlei onbelangrijke dingen praten.

In dit onderzoek krijg je 60 Nederlandse uitdrukkingen te zien. Je wordt gevraagd om voor iedere uitdrukking te beoordelen hoe makkelijk de betekenis af te leiden is van de woorden in de uitdrukking. Met deze vragenlijst hoop ik een beter beeld te krijgen van hoe uitdrukkingen verwerkt worden. Het volledig invullen van deze vragenlijst duurt ongeveer 10 minuten.

Dit onderzoek is deel van de bachelor scriptie van Thomas Jensma aan de Rijksuniversiteit Groningen, onder begeleiding van dr. Katja Mehlhorn en dr. Jacolien van Rij. Eventuele vragen over dit onderzoek kunnen gemaild worden naar Thomas (t.j.jensma.1@student.rug.nl).

B.2 Instructions part one

Zoals eerder genoemd is een uitdrukking een zin met een figuurlijke betekenis die anders is dan de letterlijke betekenis van de woorden. In dit onderzoek ben ik geïnteresseerd naar de relatie tussen de **letterlijke** betekenis en de **figuurlijke** betekenis van een uitdrukking.

Neem bijvoorbeeld de uitdrukking "bij iemand in het krijt staan". De figuurlijke betekenis van deze uitdrukking is "schulden hebben bij iemand". Deze uitdrukking stamt af van de gewoonte die mensen vroeger hadden om iemands schulden met krijt op een lei of de wand te schrijven. Oorspronkelijk was er dus een relatie tussen de uitdrukking en de figuurlijke betekenis. Echter, als je de uitdrukking nu letterlijk leest, dan heeft iemand die in krijt staat bij iemand anders niet veel te maken met de figuurlijke betekenis. Zie de afbeelding hieronder.



Figure B.1: Afbeelding 1: Een voorbeeld van waar je aan zou kunnen denken bij de letterlijke betekenis van "bij iemand in het krijt staan". (Marina Noordegraaf, 2015, <https://www.flickr.com/photos/verbeeldingskr8/18164463210>)

B.3 Instructions part two

In deze vragenlijst krijg je iedere keer een **uitdrukking** te zien. Bij elke uitdrukking wordt de **figuurlijke betekenis** gegeven. In elke vraag wordt de uitdrukking geschreven in dik gedrukte letters. Daarna volgt een dubbele punt met vervolgens de figuurlijke betekenis in schuin gedrukte letters. Dit ziet er uit als volgt: “ **uitdrukking: *figuurlijke betekenis*** ”.

Je wordt gevraagd om op een schaal van 1 tot 6 te beoordelen hoe makkelijk de figuurlijke betekenis af te leiden is uit de letterlijke betekenis van de woorden van de uitdrukking(1: erg makkelijk, 6: erg moeilijk).

Bijvoorbeeld:

De laatste adem uitblazen: *doodgaan*. In dit voorbeeld ligt de letterlijke betekenis, dat iemand voor de laatste keer uitademt, heel dicht bij de figuurlijke betekenis. Daarom zou ik in dit geval zeggen dat de figuurlijke betekenis makkelijk af te leiden is uit de letterlijke betekenis van de uitdrukking.

In de gaten houden: *toezien, opletten*. Vaak realiseren we ons niet dat “in de gaten houden” een uitdrukking is, want we gebruiken het bijna nooit letterlijk. Maar als je gaat kijken naar de letterlijke betekenis – namelijk iets of iemand in een gat of meerdere gaten vasthouden – heeft deze letterlijke betekenis niet een duidelijke relatie met de figuurlijke betekenis. Pas als je weet dat “gaten” een metafoor is voor “ogen”, wordt het makkelijker om in te zien hoe de uitdrukking zijn betekenis heeft gekregen. Daar wordt in dit onderzoek echter niet naar gevraagd. Daarom zou ik in dit geval dus zeggen dat de betekenis moeilijk af te leiden is uit de letterlijke betekenis van de woorden.